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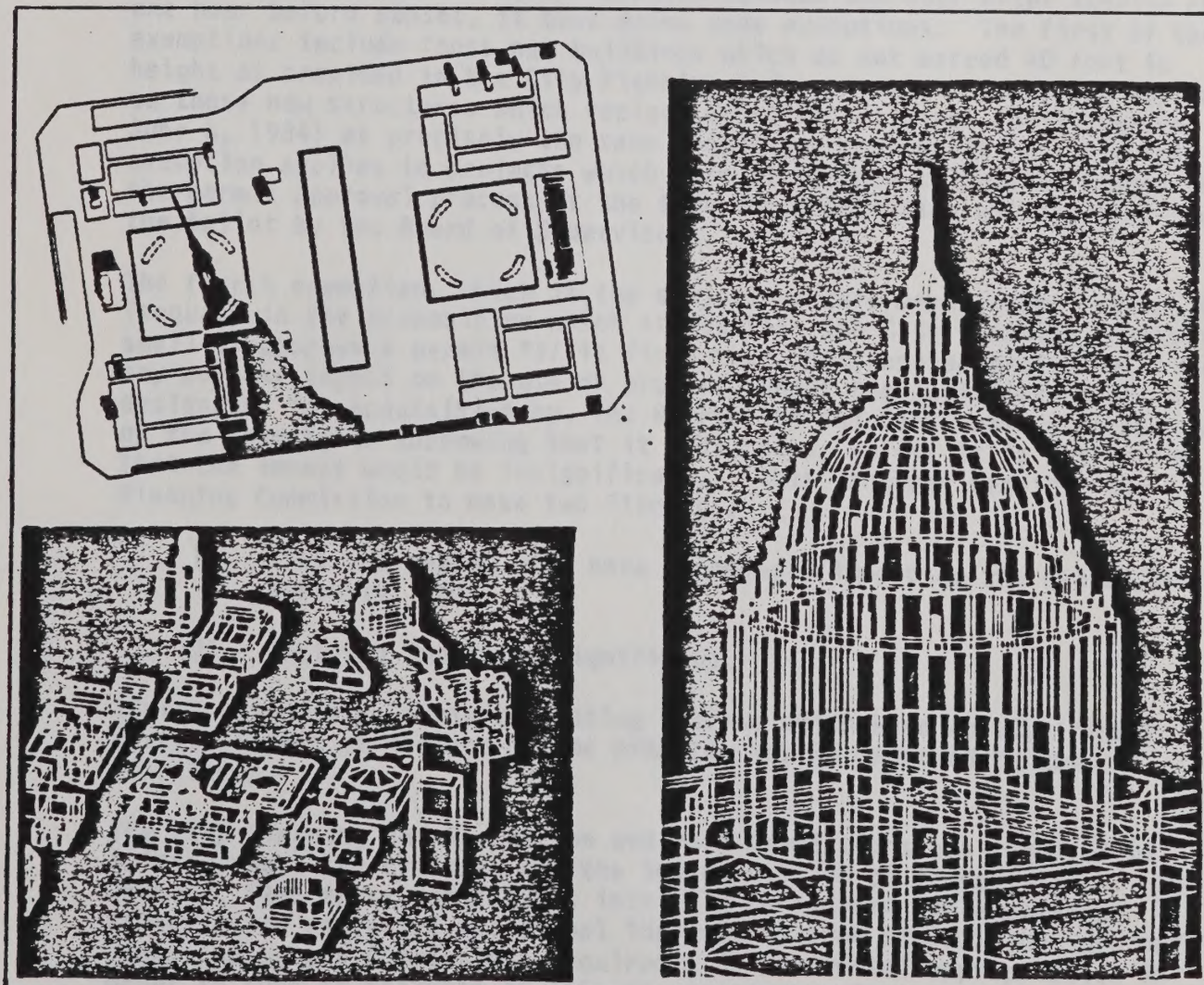
MEMORANDUM

TO : City Planning Commission
Recreation and Park Commission

November 1, 1987 *

FROM: Department of Recreation and Parks
Department of City Planning

Re: Proposition K—The Sunlight Ordinance



INSTITUTE OF CONTEMPORARY ARTS

JANUARY 1971

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INTRODUCTION

On October 22, 1987, a memorandum regarding Proposition K--The Sunlight Ordinance was published and an informational presentation was made before both Commissions. This memorandum explained the approach proposed by staff to be used in determining the significance of shadow impacts, described the technical concepts of shadow and shadow analysis and presented the model for measuring and evaluating shadows. It also included summary information on each park's physical characteristics, existing shadow distribution and potential shadow impact if all sites in the City were developed to existing height limits.

Proposition K, the Sunlight Ordinance, was passed by the citizens of San Francisco on the June 1984 Ballot in response to a growing concern about shadow impacts of buildings on the city's open spaces. The ordinance included all properties under the jurisdiction of or designated for acquisition by the Recreation and Park Commission.

Although Proposition K generally does not permit any new structures to create new shadows on these properties between one hour after sunrise and one hour before sunset, it does allow some exemptions. The first of the exemptions include those new buildings which do not exceed 40 feet in height as provided in the City Planning Code. A second exemption applies to those new structures which replace existing buildings (built before June 6, 1984) at precisely the same height and configuration. A third exemption applies to projects which were at certain stipulated stages in the permit approval process at the time the proposition was approved for the ballot by the Board of Supervisors.

The fourth exemption, which is the subject of this memorandum, relates to language in the proposition which states that the City Planning Commission shall disapprove a permit "if it finds that the proposed project will have any adverse impact on the use of property under the jurisdiction of, or designated for acquisition by, the Recreation and Park Commission because of the shading or shadowing that it will cause, unless it is determined that the impact would be insignificant." This language requires the City Planning Commission to make two findings:

- 1) That the shadow will have an adverse impact on the use of the property, and
- 2) That the impact is significant.

Stated conversely, projects casting shadows which have no significant adverse impact on the use of the property may be approved by the Commission.

The City Planning and Recreation and Park Commissions are required to jointly adopt the criteria for the implementation of Proposition K. In January, 1985 these Commissions initially considered implementation criteria and requested additional information from staff. The information requested by the Commissions required a "supplemental appropriation in order to fund an analysis of fifteen open spaces in the Downtown area that could be shadowed by new development" (Resolution No. 13887).

in 1914, the first year of the war, the number of people in the United States was 92,228,296. This was a record for the time, and it was a reflection of the fact that the United States was a young country, and it was a reflection of the fact that the United States was a country that was growing rapidly.

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The City through the Department of City Planning, entered into an agreement for professional services with the University of California at Berkeley. The Planning Department and UCB began working together to develop the computer based methodology necessary to provide the Commissions with the requested analysis.

This computer system can produce shadow information for a given park in the form of graphs and diagrams showing shadows for any day of a year, any time of the day. It can also sum up the total shadow during any time period over equal increments of time. For example, it could cast shadows every fifteen minutes between two given dates and calculate the total shadow area over the time period. It can test for new shadow from proposed buildings and produce the same detailed information on the increased shadow. Additionally, it can produce three dimensional images of all or any building casting shadow and view it from any point.

SHADOW ANALYSIS METHODOLOGY

In order to determine "significant adverse impact on use" a number of analytical tools have been developed. Initially, buildings surrounding park properties were photographed (including aerial photography for photogrammetric analysis through which building heights and park elevations can be determined within an accuracy of ± 1 foot) and cataloged. With this information a computer model of the parks and the built environment surrounding these properties was developed and used to create an existing shadow profile for each subject park property (the model is described in general in the following sections). The shadow profile consists of "snap-shots" of all existing shadows on a subject property every 15 minutes a day, one day per week for 26 weeks. The second 26 weeks of the year are the mirror image of the first 26 weeks. This shadow profile is presented in a graph format (histograms) with the amount of square feet in shadow on the vertical axis and time on the horizontal axis. These daily shadow profiles in sequence represent the year round shadow distribution of a park.

The year round shadow profile for each park forms the basis for considering how quantitative limits could be set for new shadows in a park. The following sections introduce and define some important concepts used in this analysis.

The concept of "foot-hour" was used as the unit of measure in analysis of shadows. A foot-hour of sunshine means that a square foot of space in a park is in sunshine for one hour. For Proposition K purposes, the total foot-hours of a park are determined by multiplying the size of the park in square feet by 3,721 which is the total number of hours year round between one hour after sunrise and one hour before sunset (the hours of concern for Proposition K).

For example, if there is a park of 10,000 square feet and there are 3,721 hours annually of sunlight during the specified Proposition K hours, then there are:

$$10,000 \text{ square feet} \times 3,721 \text{ hours} = 37,210,000 \text{ Total foot-hours}$$

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Foot-hours can be calculated for either sun foot-hours or shadow foot-hours. The amount of shadow in square feet multiplied by the Proposition K hours equals shadow foot-hours. Similarly, the amount of park area in sunshine multiplied by the Proposition K hours equals sun foot-hours.

If the daily shadow profiles show that there are 9,302,500 shadow foot-hours (sfh) in shadow over the entire year, that means 25% ($9,302,500 / 37,210,000 \times 100 = 25$) of the park's total foot-hours is already used up by existing shadow, and,

$37,210,000$ total ft.-hrs. - $9,302,500$ shadow ft.-hrs. = $27,907,500$ sun ft.-hrs. or 75% of the total yearly sun resource is still available.

If, for example, an absolute cumulative limit of 10% of the total foot-hours is set for this park it would mean that no more than 3,721,000 additional shadow foot-hours would be ever allowed in this park ($0.1 \times 10,000 \times 3721$).

The 3,721,000 shadow foot-hour "account" for the park could be used up with a new shadow of 1,000 square feet which lasts all day every day of the year, i.e.

$1,000$ square feet \times $3,721$ hours = $3,721,000$ shadow foot-hours

The 3,721,000 shadow foot-hour account could also be used up by a 2,000 square foot shadow that appears in the park only half the time.

From these two examples it can be seen that a small shadow that lasts for a long time can be the same shadow foot-hours as a large shadow which lasts for less time.

Criteria For Determining Significance

What amount of shadow will have "significant adverse impact on use?" Answering this question requires information about the specific park involved and the characteristics of the shadows that exist currently and the shadow that would be created by the project under consideration.

The approach recommended by staff involves two steps. The first step is to set an absolute cumulative limit for new shadow allowed in an open space. The Absolute Cumulative Limit is the additional shadow-foot-hours expressed as a percentage of the total foot-hours for each park over a period of one year. The second step is to determine individual building impacts and allocate a portion of the additional allowable shadow among specific projects within the Absolute Cumulative Limit.

Absolute Limit

It is possible to set a quantitative cap for the amount of new shadow (summed up over a period of one year) which could be allowed in each park based on the current shadow conditions in the park and the size of the park. A large park with little shadow could be permitted a larger Absolute Cumulative Limit than a smaller park with a lot of shadow, for example.

This absolute cumulative limit could be used up by one or more new buildings, but, the final determination of how much of this limit could be used by an individual building and what form the new shadow will take should be determined on a case by case basis. However, any shadow cast beyond this limit would be considered significant and could not be allowed.

Allocation of The Absolute Cumulative Limit Among Individual Buildings

Each open space has distinctive characteristics of existing shadows and the shadow that would be created by a new building. Each potential shadow also has distinctive characteristics. Depending on the proposed new building's location the shadow could be fast or slow moving (shadows of buildings near the open space will move through the open space slower than a building farther away from the open space). The proposed new building's height and location will also determine the size and shape of potential new shadow in the park, when (e.g. time of day, time of season) and where in the park the new shadow would be cast. Since a potential shadow may have immensely varied impacts at different times of day, or different seasons, or duration of the shadow, or the size or the location of the shadow, the evaluation of impact depends on a variety of qualitative factors.

Continuing with the example of the park above, if it were determined that a small shadow that lasted all day every day of the year would affect the use of the park (e.g. it put enough of the park in shade that people would no longer eat their lunches in the park), then this shadow should not be allowed even though the amount of additional shadow foot-hours was within the Absolute Limit. This reasoning can be carried out to an infinite number of scenarios. After the new shadow has been determined not to exceed the Absolute Limit, therefore, it is important to consider each building's shadow contribution or performance throughout the year.

The factors to be considered in allocating additional shadow within the Absolute Cumulative Limit will vary from park to park based on the characteristics of that park and the pattern of its existing shadows. In the case of a downtown park it may be more important to preserve the mid-day sun during all seasons and only allow small, fast moving shadows. These criteria would assure that the park users during the day would be able to enjoy sun during the lunch hours.

In the case of a neighborhood park it may be more important to preserve sun in the morning and afternoon hours during the Summer and Fall and only allow small shadows of any duration. This would assure the neighborhood

of a protected sun resource in the morning before work and in the afternoon for post work day activities during the Summer and Fall.

Qualitative criteria for each park should be developed based on existing shadow profiles, important times of day, important seasons in the year, size and duration of new shadows and the public good served by buildings casting new shadow. These bases are explained below:

Value of the Sunlight

- Time of Day (morning, mid-day, afternoon)
Based on existing shadow conditions and location of a given park, the time of day values of sunlight will have to be established. For example, afternoon and morning sun resources may be more important for preservation in neighborhood parks whereas mid-day sun may be more important in downtown parks. Additionally, some parks may have more shadow during certain times of the day when compared with other parks.
- Time of Year (Spring, Summer, Fall, Winter)
In the same way that the time of day value of sunlight has to be established, sunlight value during times of year will also have to be determined.

Shadow Characteristics

- Size of Shadow
Small shadows will generally be preferred to large shadows unless they last for long periods of time or fall on parts of the park where sunlight is particularly critical to users.
- Duration of Shadow
Shadows lasting a short period of time will generally be preferred to shadows which last a long time unless the fleeting shadows fall during a critical time of day or season and/or are so large that they disrupt use of the park.
- Location of Shadow
Efforts should be made to avoid shadows in areas of the park where existing or future use of the park is intense and where a new shadow could have detrimental effects on park vegetation.

Building Characteristics

- Public Good Served By Shadow Caster
Buildings in the public interest in terms of a needed use or building design and urban form may be allocated a larger portion of the Absolute Cumulative Limit than other buildings. For example, the Civic Center Urban Design Plan calls for a building at the same height as the existing library to continue the cornice on Marshall Square thus completing the gap in the framing of Civic Center Plaza. A new library building to

accommodate the growing needs of the Public Library is proposed at that space. This new building would cast new shadows in the morning hours on Civic Center Plaza. If the new building could not cast shadows, the ability to use the site for the library would be severely limited. Most of the Civic Center Plaza shadow "budget" could perhaps be allocated to be used by this library.

PROPOSAL FOR CONSIDERATION BY BOTH COMMISSIONS

The Proposition K mandate is to minimize new shadow impacts and protect the sun resource on San Francisco open spaces. In order to accomplish this goal an Absolute Cumulative Limit is proposed for each individual park. This limit is the additional amount of shadow-foot-hours expressed as a percentage of total-foot-hours of each park. Additionally, for each open space, criteria for the approval of new buildings have been proposed to evaluate allocations within the Absolute Cumulative Limit.

In the summary table below and in the following pages individual parks are described in terms of their physical characteristics, shadow characteristics and use. The last column of the table lists the proposed Absolute Cumulative Limit for each park. On the basis of the large amount of existing yearly shadow and the size and use of the parks, an Absolute Cumulative Limit of zero percent is proposed for five parks. No additional shadow is also proposed for North Beach Play Ground because existing height limits would preclude any new shadows. An Absolute Cumulative Limit of one percent is proposed for Civic Center Plaza and Washinton Square because of their large size and very little existing shadow. For the remaining open spaces, a limit of 0.1 % is proposed.

SUMMARY OF SHADOW IMPACTS AND PROPOSED ABSOLUTE CUMULATIVE LIMITS

NO.	PARK NAME	PARK AREA	EXISTING SHADOW TOTAL FT/HRS	EXISTING SHADOW FT/HRS	% SHADOW	ADDITIONAL† SHADOW FT/HRS	TOTAL POTENTIAL SHADOW FT/HRS	% SHADOW	% INCREASE	ABS. CUM. LIMIT	ADDITIONAL SHADOW FT/HRS**
1	Civic Center	222,295	827,248,613	61,547,460	7.4	10,404,296	71,951,756	8.7	1.3	1.0	8,272,486.1
2	Embarcadero Plaza 2	149,698	557,086,137	209,319,065	37.6	23,078,115	232,397,180	41.7	4.1	0.1	557,086.1
3	Union Square	105,515	392,663,521	150,494,339	38.3	20,911,944	171,406,283	43.7	5.3	0.1	392,663.5
4	Washington Square	98,991	368,385,107	21,487,753	5.8	12,593,684	34,081,437	9.3	3.4	1.0	3,863,851.0
5	North Beach	94,930	353,272,502	37,579,831	10.6	0	37,579,831	10.6	0.0	0.0	0.0
6	Maritime Plaza	83,936	312,359,430	213,685,676	68.4	12,325,572	226,011,248	72.4	3.9	0.0	0.0
7	Embarcadero Plaza 1	58,395	217,311,153	76,362,983	35.1	78,911	76,441,895	35.2	0.0	0.1	217,311.1
8	Portsmouth Square	54,773	203,832,242	79,425,677	39.0	2,289,287	81,714,963	40.1	1.1	0.0	0.0
9	St. Mary's Square	46,781	174,090,813	90,387,985	51.9	16,711,279	107,099,264	61.5	9.6	-0.1	174,090.8
10	Huntington Park	46,486	172,993,000	38,052,710	22.0	4,012,794	42,065,504	24.3	2.3	0.1	172,993.0
11	South of Market	44,940	167,239,716	12,262,241	7.3	17,248,546	29,510,787	17.6	10.3	0.1	167,239.7
12	Boeddecker Park	38,841	144,542,897	54,436,100	37.7	20,125,267	74,561,367	51.6	13.9	0.0	0.0
13	Chinese Playground	25,592	95,238,069	50,245,182	52.8	5,507,731	55,752,913	58.5	5.8	0.0	0.0
14	Sgt. MacAulay	9,021	33,570,749	13,816,953	41.2	4,159,261	17,976,214	53.5	12.4	0.0	0.0

† Additional shadow on parks if no limits were set and all sites in the city were developed to existing height limits.

** Additional shadow on parks if recommended limits were adopted.

PARK NAME: Civic Center Plaza

LOCATION: Polk, Grove, Larkin, McAllister
In the Civic Center, with major government offices, library and Brook Hall surrounding the open space.

SIZE: 222,995 square feet
Civic Center Plaza is the largest downtown park.

CHARACTERISTICS: Heaviest use occurs during mid-day hours. Users are civic center workers, tourists and street people. Features include some park furniture for sitting, lawn area and fountain. This park is the location for many civic demonstrations, assemblies and cultural activities. This is a relatively flat formal park. A parking garage is located beneath the park. Adopted redesign of the park will accommodate more use by neighborhood children and day care providers.

SUN AND SHADOW CONDITIONS:

Yearly Shadow: 7.4% of the total year round sunshine is used up by existing shadows. Civic Center is one of the sunniest of the downtown parks. During most of the year the daily shadow distribution profile is that of a relatively flat "U" shape with greater shadows in the afternoon than in the morning. By Winter the "U" shape has flattened further by decreases in shadows early and late and increased shadows at mid-day.

Seasonal Shadow:

- **Summer:** Sunny all day except in the late afternoon hours when an average of less than 40% of the park is in shade. Some shadows very early in the morning and very late in the afternoon. Almost no shadows from 9 AM to 4 PM. Approximately 5% in shadows during the Summer Solstice.
- **Spring/Fall:** In general summer shadow conditions continue from the Spring and into the Fall. There are however less shadow impacts during the early morning hours and more shadows in the afternoon than occur during the Summer months. Approximately 5% in shadows during the Equinox.
- **Winter:** Nearly 75% of the park remains in sun during the Winter months. In late afternoon hours there are increased shadow impacts on the open space. Approximately 10% in shadows during the Winter Solstice.

ADDITIONAL SHADOW

Absolute Limit: Increase of up to 1.0% of total foot-hours for the park based on size of the park and the amount of existing shadow.

A maximum of 8,272,486.1 new shadow foot hours could be allowed.

Qualitative Criteria:

- Preserve afternoon sun, particularly on seating areas and lawn areas.

PARK NAME: Embarcadero Center 2

LOCATION: Embarcadero, Clay & Steuart
This open space is located at the Eastern edge of the Financial District.

SIZE: 149,698 square feet
The second largest Downtown park.

CHARACTERISTICS: This park is a plaza surrounded by large office buildings with many ground floor restaurants opening on to the space. The plaza contains a large fountain, open air cafes and is predominately paved. There is a flat grass area at the South end of the plaza. The space has excellent access from Market Street and South of Market Street. During lunch hour the park is heavily used by workers from the Financial District. Tourist use of the park is also heavy due to its location at the base of Market Street, proximity to the Ferry Building, California Street cable car line and the Hyatt Regency. Noon concerts, fashion shows and performances create a great deal of day use of the park.

SUN AND SHADOW CONDITIONS:

Yearly Shadow: This open space has significant sun resources during the morning hours. Afternoon shadows are heavy. The "J" shape to the shadow profile is consistent throughout the Spring, Fall and Summer due to the morning sun and the heavy afternoon shadows. The "J" shaped shade curve disappears in the Winter. In the Winter no more than 50% of the park is in the sun after the noon hour. The shape of the curve in Winter is represented by a shaft of sun in the morning and a nearly solid block of shadow in the post morning hours. Overall, 37.6% of the annual sun resource is currently in shadow.

Seasonal Shadow:

- **Summer:** Between 8:30 am and noon there are almost no shadows in the plaza. Before 8:30 am nearly 40% of the space is in the shade. After the mid-morning sun the shadows gradually increase until 100% of the park is in shadow at the end of the day. 30% shaded during the Summer Solstice.
- **Spring/Fall:** For two hours in the mid-morning there is 100% sun in the park. After 11:30 am the shadows increase such that mid-afternoon shadows are greater than in Summer but never reach the 100% shadows of late afternoon Summer days. 60% shaded during the Equinox.

- Winter: During the Winter there is a brief two hour period where the park is in the sun. After 10 am shadows increase rapidly and by noon in mid-December 90% of the plaza is in the shade. 80% shaded during the Winter Solstice.

ADDITIONAL SHADOW

Absolute Limit: Increase of up to 0.1% of total foot-hours for the park based on size of park and amount of existing shadows. A maximum of 557,086.1 new shadow foot-hours could be allowed.

Qualitative Criteria:

- Avoid mid-day and Winter shadows.

PARK NAME: Union Square

LOCATION: Geary, Post, Powell, Stockton
Located in the center of the City's retail district.

SIZE: 105,515 square feet
This park ranks as the third largest Downtown park.

CHARACTERISTICS: The park is surrounded by tall buildings to the east, west and the south. This relatively flat formal park is slightly elevated from the surrounding streets. Features include park furniture for sitting and lawn areas. The greatest intensity of park use occurs during mid-day hours. Users are downtown workers, shoppers, tourists. Many pedestrians use the park as a mid-block crossing. This park is the location for many civic demonstrations and cultural activities. Union Square is near the Powell Street cable car line and major hotels. A parking facility is located beneath the park.

SUN AND SHADOW CONDITIONS:

Yearly Shadow: 38.3% of the total year round sunshine is used up by existing shadows. The shadow profile for this park is generally a "U" shaped shadow distribution with significant shadows in the morning and even greater shadows in the afternoon hours. The "U" shaped distribution is increasingly flat in the Winter due to increased mid-day shadows.

Seasonal Shadow:

- **Summer:** Least shadow impacts - greatest sun resource. Shadowed in early morning and late afternoon with relatively more shadow during the afternoon hours. Approximately 30% of the sun resource is in shadows at the time of the Summer Solstice.
- **Spring/Fall:** Major shadow impacts during the early morning and late afternoon hours. Morning shadows increase as Fall approaches. The least shadow impacts occur between 9:30 AM and 2:30 PM. During Equinox approximately 35% of the park sun resource is in shade.
- **Winter:** The greatest shadow impacts on Union Square occur during the Winter months. In Winter, nearly 50% of the park is in shadow for the entire day. There is very little sunlight available before 9:30 AM and after 2:30 PM during the winter. The Winter Solstice conditions are such that 60% of the park sun resource is in shadow.

ADDITIONAL SHADOW

Absolute Limit: Increase of up to 0.1% of total foot-hours for the park based on size and amount of existing shadow.
A maximum of 392,663.5 new shadow foot-hours could be allowed.

Qualitative Criteria:

- Avoid additional shadows during mid-day.

PARK NAME: Washington Square

LOCATION: Union, Powell, Filbert & Stockton
It is located in a neighborhood commercial district of the North Beach area.

SIZE: 98,991 square feet
Washington Square is the fourth largest downtown park.

CHARACTERISTICS: Buildings surrounding the open space are between one and four stories in height which permits a great deal of sunshine in the park. The park contains a children's playground in the north-west section, a large lawn area and seating furniture along walkways. Users of the park are primarily children, elderly neighborhood residents and general neighborhood use. This flat park also contains a separate and isolated section in the intersection of Powell, Union and Columbus. Due to the separation from the remainder of the park and the vegetation on the isolated section, it is fenced and provides a visual element as open space but is not accessible for public use.

SUN AND SHADOW CONDITIONS:

Yearly Shadow: In general this park is very sunny year round - 5.8% of the annual sun resource is currently in shadow. From March through September the shadow profile distribution is a relatively flat "U" shape with minimal shadows in the morning and afternoon and no mid-day shadows. Between October and February the "U" shape is increasingly steep due to increased morning and afternoon shadows.

Seasonal Shadow:

- **Summer:** There are almost no shadows in the park between 9am and 6pm. 5% shaded during Summer Solstice.
- **Spring/Fall:** As in Summer, there are relatively small shadow impacts on the park between 9am and 6pm. Toward the end of Fall and in early Spring during the afternoon there are increasing shadows cast by the hills and buildings to the West. 5% shaded during the Equinox.
- **Winter:** Shadows increase overall during the Winter months. No more than 10% of the park is shaded between the hours of 9am and 4pm and the afternoon shadows continue to increase. 15% shaded during the Winter Solstice.

ADDITIONAL SHADOW

Absolute Limit: Increase of up to 1.0% of total foot-hours for the park based on size of park and amount of existing shadows. A maximum of 368,385.1 new shadow foot-hours could be allowed.

Qualitative Criteria:

- Avoid afternoon shadows on children's play area.

PARK NAME: North Beach Playground

LOCATION: Powell, Mason, Greenwich & Lombard
The park is located in a mid rise residential and commercial use neighborhood.

SIZE: 94,930 square feet
This is the fifth largest Downtown park.

CHARACTERISTICS: The park is flat and has three large buildings on site. Other facilities include bocci ball, tennis courts, volleyball court, a children's playground and tot lot in the South-west section. There are virtually no trees or lawn areas. Users of the park are primarily children and young athletes. The bocci ball courts are used by elderly residents and the court has a separate entrance off of Columbus.

SUN AND SHADOW CONDITIONS:

Yearly Shadow: One of the sunniest downtown parks - 10.6% of the annual sun resource is currently in shadow. Throughout the year this park shadow profile curve is a relatively flat "U" with minimal shadows in the morning and afternoon and nearly full sun during the mid-day hours.

Seasonal Shadow:

- **Summer:** In this park there almost no shadows between 8:30am and 7pm. Early morning shadows are greater than afternoon shadows and in the work shade of the season 45% of the park remains in the sun. 5% shaded during Summer Solstice.
- **Spring/Fall:** Summer shadow patters persist during Fall and Spring. Hills to the East and West increase the shadows on the park during late afternoon and early morning when Winter is near. 10% shaded during the Equinox.
- **Winter:** Shadow patterns remain the same with relatively more shadows overall. Early morning and late afternoon are the most heavily impacted shadow times. 15% shaded during Winter Solstice.

ADDITIONAL SHADOW

Absolute Limit: No additional shadows should be permitted for the park based on size of park and amount of existing shadows.

PARK NAME: Maritime Plaza

LOCATION: Battery, Washington, Davis and Clay
This open space is located to the North of the Embarcadero Center complex.

SIZE: 83,936 square feet
The sixth largest Downtown park.

CHARACTERISTICS: A tall building separates the East and West ends of the plaza. Parking facilities are located beneath the plaza and it is elevated from street level. Access to the plaza is by centrally located stairs and stairs on the West end. The plaza contains some lawn area, vegetation, sculptures and a fountain. Seating facilities are located in the plaza around the sculptures. Pedestrian use of the park is heavy during the day while lingering utilization of the park is not intense. Most of the users are downtown workers.

SUN AND SHADOW CONDITIONS:

Yearly Shadow: This open space is heavily impacted by shadows - 68.4% of the annual sun resource is currently in shadow. During May, June and July the general shape of the shadow profile distribution is a relatively steep "V" shape with significant morning and afternoon shadows. During the remainder of the Summer and Fall the "V" shape becomes increasingly filled in with mid-day shadows. By December, no less than 80% of the park is in shadow during any hour of the day.

Seasonal Shadow:

- Summer: Except for 2-3 hours during mid-day more than 50% of the plaza is in shadow. Afternoon shadow impacts are greater than early morning shadows. As the Fall approaches the morning shadow increase. 50% shaded during Summer Solstice.
- Spring/Fall: During the Fall and late Spring the open space is more than 50% shaded throughout the day. 75% shaded during the Equinox.
- Winter: During the Winter 65% or more of the park is shaded throughout the day. 90% shaded during Winter Solstice.

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ADDITIONAL SHADOW

Absolute Limit: No additional shadows should be permitted for the park based on size of park and amount of existing shadows.

PARK NAME: Embarcadero Center 1

LOCATION: Washington, Drumm, Clay & Embarcadero
This park is located to the North of the 480 Highway ramps for Clay and Washington Streets and is surrounded by high rise commercial buildings.

SIZE: 58,395 square feet
This is the seventh largest Downtown park.

CHARACTERISTICS: The park is flat and contains lawn areas and walkways. The park less than heavily used because of its relatively isolated location.

SUN AND SHADOW CONDITIONS:

Yearly Shadow: 35.1% of the annual sun resource is in shadow. Afternoon shadows are greater than morning shadows resulting in a "J" shaped shadow profile curve during June and July. In March, April August and September mid-day shadows increase and the shadow profile curve becomes a "W" shape. Between October and February the mid-afternoon shadows increase dramatically and the shape of the shadow profile curve is a flat "J" shape shifted towards the morning hours.

Seasonal Shadow:

- **Summer:** During this season the park is sunny except in the late afternoon hours. 10% shadowed during the Summer Solstice.
- **Spring/Fall:** Morning and afternoon shadow patterns during Fall and Spring are similar to the Summer shadow pattern. Mid-day shadows increase to nearly 70% of the park due to buildings located to the South of the park. 35% shaded during the Equinox.
- **Winter:** Shadow patterns in Winter display heavy shadows throughout the day with the greatest sun resource occurring during early morning hours. No less than 35% of the park is in shade during mid-December days. 75% shaded during Winter Solstice.

ADDITIONAL SHADOW

Absolute Limit: Increase of up to 0.1% of total foot-hours for the park based on size of park and amount of existing shadows. A maximum of 217,311.1 new shadow foot-hours could be allowed.

Qualitative Criteria:

- Avoid mid-day shadows.

PARK NAME: Portsmouth Square

LOCATION: Washington, Kearny, Clay & Brenham Alley
In Chinatown surrounded by high density commercial and residential uses.

SIZE: 54,773 square feet
The eight largest Downtown park.

CHARACTERISTICS: A stairway connects the two levels of this Chinatown park which is built over a parking garage. A sky bridge also connects the park to a hotel on Kearny. The open space is a major meeting and seating area for residents of Chinatown. Children, often supervised by day care providers are heavy users of the space. Major events are also staged on the plaza. Chinese exercise classes are conducted during the morning hours and board games are played throughout the day. Due to the lack of open space in Chinatown the centrally located park is heavily used. A number of tall buildings form the Eastern border of the park.

SUN AND SHADOW CONDITIONS:

Yearly Shadow: 39% of the annual sun resource is currently in shadow. The shadow profile for this park is generally a "U" shaped curve with heavy shadows in the morning and afternoon during all but the Winter season. During Winter the park receives mid-day shadows changing the shape of the shadow profile to that of a "W" shaped curve.

Seasonal Shadow:

- **Summer:** Less than 10% of the park is in shadows during mid-day hours (10am-2pm). More shadows occur in the afternoon and early morning hours. 35% shadowed during the Summer Solstice.
- **Spring/Fall:** Heavily shadowed before 9:30 am and after 3 pm. An average 10% of the park is in shadows during the mid-day hours. 40% shadowed during the Equinox.
- **Winter:** The shadow pattern during the Winter months is greater relative to other seasons during all times of the day. The park is heavily shadowed during the morning and afternoon with two additional peak shadow hours around 10 am and noon. 55% shadowed during the Winter Solstice.

ADDITIONAL SHADOW

Absolute Limit: No additional shadows should be permitted for the park based on size of park and amount of existing shadows.

PARK NAME: Saint Mary's Square

LOCATION: On Pine & California, between Quincy Alley and Kearny
This park is located in the office and retail district of the downtown area.

SIZE: 46,781 square feet - This square footage includes area designated by the Recreation and Park Department for expansion. The square is a medium sized downtown park, and ranks as the ninth largest of the 15 open spaces.

CHARACTERISTICS: The open space is surrounded by predominantly office uses with tall buildings on the East and South. Most use of the park occurs during noon hours, although use of the open space is less than other Chinatown open spaces because of enclosed setting and lack of sunlight. The park has no access from the heavily pedestrian traveled Kearny Street. The park entrances located on California and Pine are on a hill and therefore pose some accessibility problems. In the future, a Kearny Street entrance may be provided.

SUN AND SHADOW CONDITIONS:

Yearly Shadow: This park is heavily shaded throughout the year. 51.9% of the annual sun resource for the park is in shadow. Generally, morning shadows are greater than afternoon shadows. During May, June and July the shadow profiles are "U" shaped distributions. For the remainder of the year, the mid-day shadows increase and the shadow profiles become "W" shaped. The mid-day peak in the shadow profiles result from shadows cast by buildings to the South of the park.

Seasonal Shadow:

- **Summer:** The park is mostly in shade during the early morning and late afternoon hours. The least amount of shade occurs between the hours of 11am and 3pm. Toward the end of Summer the noon shadows increase. At the time of Summer solstice (around June 21st) nearly 40% of the total foot-hours for the park are in shade during the Proposition K hours.
- **Spring/Fall:** Except for one hour in the morning (around 10am) and one hour in the afternoon (around 3pm) the park is heavily shaded. Hourly shadows increase as Winter proceeds until the equinox (around March and September 20th) when close to 45% of the park is shaded during Proposition K hours.

• Winter:

The shadow pattern of Fall also apply during the Winter with an even greater increase in shadows. The minimum shade impacts on the park occur during late morning, noon and early afternoon hours. For one hour around 10am and two hours around 2:30pm the park has the greatest amount of sunlight. Around December 20th (Winter solstice) approximately 70% of the park would be in shade during the Proposition K hours.

ADDITIONAL SHADOW

Absolute Limit: Increase of up to 0.1% of total foot-hours for the park based on size of park and amount of existing shadows. A maximum of 174,090.8 new shadow foot hours could be allowed.

Qualitative Criteria:

- Avoid mid-day shadows.

PARK NAME: Huntington Park

LOCATION: Sacramento, Cushman, California & Taylor
This park is located at the top of Nob Hill and is surrounded by landmark San Francisco hotels.

SIZE: 46,486 square feet
This is the twelfth largest Downtown park.

CHARACTERISTICS: The relatively level park is elevated from the street level and has a children's playground in the northern section of the open space area. Other park features include a tree lined perimeter and walking areas in the center.

The park serves both neighborhood resident uses and hotel guests. The playground is most heavily used when schools are out in the afternoon. This recently redesigned park is now heavily used.

SUN AND SHADOW CONDITIONS:

Yearly Shadow: Compared to many other downtown parks, this open space is not heavily shaded. 22% of the annual sun resource for this park is in shadows. Located at the top of a hill and circumscribed with wide streets provides the park with a great deal of unimpeded sun resources. Shadows are greatest during the early morning and late afternoon hours. The general "U" shaped daily shadow distribution becomes more "W" shaped from September through March due to increased mid-day shadows. Buildings to the distant South of the park begin to increase the mid-day shadows during September.

Seasonal Shadow:

- **Summer:** There are almost no shadows in the park from 9am to 3:30pm. Shadows are greater at the beginning and end of the day. 10% shadow during Summer Solstice.
- **Spring/Fall:** Shadow patters similar to Summer with increasing shadows before 10am and after 3pm. As winter approaches the buildings to the South 15% shaded during Equinox.
- **Winter:** During the Winter months shadows are greater during mid-day hours and morning than they are at other times of the year. 50% shadow at the time of Winter Solstice.

ADDITIONAL SHADOW

Absolute Limit: Increase of up to 0.1% of total foot-hours for the park based on size of park and amount of existing shadows. A maximum of 172,993 new shadow foot-hours could be allowed.

Qualitative Criteria:

- Avoid shadows in PM hours.
- Avoid shading the children's use area.

PARK NAME: South of Market Park

LOCATION: The north-western corner of the intersection of Folsom and Sixth Street. The park is surrounded by low rise residential, retail and light industrial uses.

SIZE: 44,940 square feet
This is the fifth smallest Downtown park.

CHARACTERISTICS: This park is currently under development, fenced and not open to the public. The parks location is in the South of Market Residential Hotel District. At this time there is not a great deal of pedestrian traffic on the streets surrounding the park. Buildings surrounding the park are typically between two and four stories. The park is in a neighborhood location lacking in recreational facilities and open space. A recreation center will be constructed on the North boundary. The remainder of the open space will include a children's play area, seating areas and lawn.

SUN AND SHADOW CONDITIONS:

Yearly Shadow: The park is sunny throughout the year except during late afternoon hours. 7.3% of the annual sun resource for this park is currently in shadows. Very little shading occurs during the morning hours and shadows do not increase to more than 5% of the park until 3pm. This shadow pattern continues throughout the four seasons.

2% Summer Solstice
2% Fall Equinox
4% Winter Solstice

ADDITIONAL SHADOW

Absolute Limit: Up to 0.1% increase in total foot-hours for the park based on size of park and amount of existing shadows. A maximum of 167,239.7 new shadow foot-hours could be allowed.

Qualitative Criteria:

- Avoid additional shadows on children's area and senior seating.
- Afternoon shadows should be avoided.

PARK NAME: Boeddeker Park

LOCATION: Ellis, Jones, Eddy & Taylor
Located in a Downtown neighborhood with a high density mix of residential, hotel and retail/restaurant uses.

SIZE: 38,841 square feet
Boeddeker ranks as the fourth smallest Downtown park.

CHARACTERISTICS: Located in the Tenderloin district with entrances from three of the surrounding street, this flat park is heavily used by neighborhood residents. The lawn, trees and basketball 1/2 court are the principal features of the park.

SUN AND SHADOW CONDITIONS:

Yearly Shadow: In general the greatest shadows occur in early morning and late afternoon hours. Morning hours are a bit more heavily shaded than the afternoon hours. 37.7% of the annual sun resource is currently in shadow. The shadow profile is generally a "U" shaped curve which flattens out with increased mid-day shadows during the month around the Winter season.

Seasonal Shadow:

- **Summer:** Between 9am and 3pm the range of shadow in the parks runs from as little as 5% shadow to as much as 40% shadow. More shadows occur in the morning hours than after noon time. 20% shadow during Summer Solstice.
- **Spring/Fall:** Shadow patterns during the Spring and Fall are similar to those found during the Summer. The amount of shadow does increase as Fall proceeds and decreases as Spring fades to Summer. 25% shadow during Equinox.
- **Winter:** As much as 50% of the park is in shade during most of the Winter months. Again shadows are greater during the morning hours. 60% shadow during Winter Solstice.

ADDITIONAL SHADOW

Absolute Limit: No additional shadows should be permitted for the park based on size of park and amount of existing shadows.

PARK NAME: Chinese Playground

LOCATION: Sacramento, Clay, Stockton & Grand
This park is located in the center of the Chinatown residential district.

SIZE: 24,950 square feet
This park rank as the second smallest Downtown park.

CHARACTERISTICS: The park contains a basketball and volleyball court, children's playground and a building with exercise facilities. The courts are separated from the rest of the park by a stairway. Residential buildings surround the playground. This heavily used park is used primarily by children residing in the nearby area.

SUN AND SHADOW CONDITIONS:

Yearly Shadow: This park is heavily shaded in the morning and afternoon hours. From April to August the shape of the shadow profile curve is that of a "V" due to rapidly decreasing shadows until noon and rapidly increasing shadows following noon. From September to March the shadows during morning and mid-day hours increase while afternoon hours dramatically increase changing the shape of the curve to a flat "U" with the bottom of the "U" shifted toward the morning hours. In the course of a year, 52.8% of the existing sun resource for the park is in shadow.

Seasonal Shadow:

- **Summer:** The park is 100% shaded in the morning hours and is increasingly in the sun as noon approaches. The shadows increase after the noon hour until the park is 100% in shade again in the late afternoon hours. 40% shaded during the Summer Solstice.
- **Spring/Fall:** During early Spring and late Fall early morning shadows increase from the Summer conditions. 50% shaded during the Equinox.
- **Winter:** Shadows increase during the Winter and afternoon shadows become increasingly greater relative to the morning shadow conditions. 65% shaded during the Winter Solstice.

ADDITIONAL SHADOW

Absolute Limit: No additional shadows should be permitted for the park based on size of park and amount of existing shadows.

PARK NAME: Sergeant John MacAulay

LOCATION: North-western corner of the intersection of O'Farrell and Larkin
The park is surrounded by high density residential and retail uses.

SIZE: 9,021 square feet
This is the smallest downtown park and is located in the Tenderloin District.

CHARACTERISTICS: The features of this small flat park include grass areas, trees and seating. The open space is heavily used by neighborhood residents.

SUN AND SHADOW CONDITIONS:

Yearly Shadow: Throughout the year this park is fully shaded in the afternoon hours. Shadows in the morning are initially heavy but decrease rapidly. 41.2% of the existing annual sun resource is in shadow. The "U" shaped shadow profile is shifted toward the morning hours due to the heavy afternoon shadows. During the Winter months the "U" shape to the shadow profile curve is lost due to increased mid-day shadows.

Seasonal Shadow:

- **Summer:** The greatest sun resource in the park occurs during the times between 9am and 1pm. Heavy shadows occur both before 9am and after 1pm. 40% shadowed during the Summer Solstice.
- **Spring/Fall:** The shadow patterns during the Spring and Fall are similar to that of Summer with increased shadows throughout the day and particularly during the hours between 9am and 1pm. 40% shaded during the Equinox.
- **Winter:** Except for one hour around 10am the majority of this open space is in shadows. 70% shaded during the Winter Solstice.

ADDITIONAL SHADOW

Absolute Limit: No additional shadows should be permitted for the park based on size of park and amount of existing shadows.



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